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Air Diffusor, especially for Vehicle Air-Conditioning

Technical Field

The invention relates to an air diffusor, in particular for vehicle air-conditioning.

Background of the Invention

Typically, an air diffusor has vanes which can be arranged either horizontally or vertically, and with which the direction of the airflow coming out of the vent can be adjusted. Normally, the vanes can be rotated about axes that are permanently stationary with respect to the housing. In order not to hinder the rotation of the vanes, there has to be sufficient space between the outer vanes and the housing. Consequently, at certain angle positions of the vanes in the edge area, the airflow can only be directed inadequately. Moreover, at certain angle positions, the impression is given of an uneven distribution of the diffusor surface.

Brief Summary of the Invention

Therefore, the object of the invention is to reduce as much as possible the distance between the external vanes and the housing, especially in the two extreme positions of the vanes, so that there is no undirected airflow in the edge area of the vent. Moreover, at each angle position, a uniform distribution of the vanes across the surface of the diffusor should be possible.

This is achieved in an air diffusor which comprises a housing, a plurality of vanes of which each is pivotally mounted, and an adjustment element by means of which an orientation of the vanes can be adjusted. A first coupling element is provided with which each vane is coupled so as to be rotatable about a first swiveling axle. The first coupling element is supported on the housing so as to slide in a sliding guide, and a second swiveling axle is provided on each vane. Due to the fact that the vanes are not swiveled about a single swiveling axle that is

permanently stationary with respect to the housing but rather about two swiveling axes, it is possible to maintain a very small distance between the external vanes and the housing by shifting the rotational axes of the vanes, even if the vanes are in their extreme positions. It is aimed for that the topmost and lowermost vanes lie directly against the housing when they are in their respective extreme positions.

According to a preferred embodiment of the invention it is provided for that a second coupling element is used that is movable relative to the housing, each of the vanes being coupled to the second coupling element in such a way that it can rotate about the second swiveling axle, and that the adjustment element is connected to the first and second coupling elements in such a way that, by activating the adjustment element, a position of the coupling elements relative to each other and thus an orientation of the vanes can be adjusted. With this embodiment, the shifting of the vanes results from the superposition of two translation movements by the coupling elements. In addition to the advantages listed above, by means of the manner of adjustment of the coupling elements, the arrangement of the vanes in different, tilted positions can be brought about in such a way that the impression is given of an even distribution of the vanes.

According to another preferred embodiment of the invention, it is provided for that the second swiveling axle is supported in a sliding guide in the housing, the sliding guide of the second swiveling axle being aligned approximately perpendicular to the sliding guide of the first coupling element. With this embodiment, a simple structure yields essentially the same advantages as with the first embodiment.

Advantageous embodiments of the invention will be apparent from the subordinate claims.

Brief Description of the Drawings

Figure 1 is a front view of an air diffusor according to a first embodiment in a cut-away view;

Figure 2 is a side view of the air diffusor of Figure 1;

Figure 3 is an air diffusor according to a second embodiment in a schematic side view;

Figure 4 is a section along the line IV-IV of Figure 3; and

Figure 5 is an air diffusor according to a third embodiment in a schematic side view.

Detailed Description of the Preferred Embodiments

Figure 1 shows an air diffusor **10** according to a first embodiment that has a housing **12** as well as a plurality of vanes **14** arranged therein (also see Figure 2).

In the housing, a first coupling element **16** is provided as well as a second coupling element **18**, which are both designed as coupling rods. The first coupling element **16** is supported in the housing **12** in a sliding guide **20**, which is only shown here schematically. A guide for the second coupling element **18** is not necessary. The front end of each of the vanes **14** is supported rotatably on the first coupling element **16** and the rear end of each of the vanes **14** is supported rotatably on the second coupling element **18**. For this purpose, there are provided pegs **22** that engage in corresponding openings in the coupling elements.

An adjustment element **24** is rotatably supported in the housing **12** and it is configured as an adjustment wheel here. The adjustment element **24** is provided with a first slot **26** and a second slot **28**. The two coupling elements **16, 18** are provided with pins **30** that engage in the slots **26** and **28** respectively, so that the position of the first coupling element **16** is determined by the first slot **26** while the position of the second coupling element **18** is determined by the second slot **28**.

By rotating the adjustment element **26**, the orientation of the vanes **14** can be adjusted relative to the housing, so that the direction of an airflow emerging from the diffusor **10** can be adjusted. When the adjustment element **24** is rotated

clockwise away from the position shown in Figure 2 in which the vanes **14** are positioned horizontally, the second coupling element **18** is shifted by the slot **28** downwards relative to Figure 2, whereas the first coupling element **16** is not moved. This is due to the fact that the pin **30** of the first coupling element enters an area of the slot **26** that is approximately concentric to the rotational axis of the adjustment element **24**. As a result of the shifting of the two coupling elements relative to each other, the rear area of the vanes **14** is moved downwards, whereas the front area remains approximately stationary. Consequently, an airflow coming out of the diffusor is deflected upwards.

Depending on the design of the slots, the front coupling element could also be shifted in response to a clockwise rotation so that the shifting of the vanes results from a superposition of two movements.

However, when the adjustment element **24** is rotated counterclockwise from the position shown in Figure 2, the first coupling element **16** is shifted downwards. The second coupling element **18** moves only slightly since the pin **30** of the second coupling element enters an area of the slot **28** that extends approximately concentric to the rotational axis of the adjustment element **24**, that is to say, to the left towards the first coupling element relative to Figure 2, while it remains at about the same height. Thus, the front edge of the vanes **14** is moved downwards and an airflow coming out of the diffusor is deflected downwards.

Since the vanes **14** are no longer swiveled about a stationary axis as is the case with a conventional air diffusor, but rather are shifted by means of the superposition of two translation movements by the coupling elements, the two outer vanes can be positioned much closer to the housing **12** and, in the extreme positions, can lie directly against said housing, so that the airflow coming out of the diffusor is deflected in this area as well.

In this embodiment, the coupling elements can be shifted by means of the adjustment wheel in such a way that the vanes can be brought into a position that is pivoted by 90° relative to Figure 2, that is to say, into a vertical position in

which they all lie in one plane. In this case, a narrow gap remains between each of the edges of the individual vanes and the air can emerge from the diffusor without being directed in a specific direction.

Figures 3 and 4 show a diffusor **10** according to a second embodiment. The same reference numerals are used for the components known from the first embodiment, and reference is made to the explanations above.

In the second embodiment as well, a first coupling element **16** is provided for sliding movement on the housing and to which the vanes are attached by means of the first swiveling axle **21**. In contrast to the first embodiment, however, there is no second coupling element provided; each vane is supported in the housing by means of the second swiveling axle **22** directly in a second sliding guide **40** (here shown for only one of the vanes). The second swiveling axle **22** is positioned somewhat behind the middle of the vane as seen from the first swiveling axle arranged on the front edge of each vane.

The vanes can be swiveled by means of the adjustment element **24** into the desired position, the adjustment element being designed here as an adjustment knob that is mounted directly on one of the vanes so that it is accessible from the outside.

With this embodiment, too, the vanes are shifted by means of the superposition of two translation movements; the first swiveling axle **21** is adjusted in the direction established by the first sliding guide **20**, whereas the second swiveling axle **22** is shifted in the direction perpendicular thereto, established by the second sliding guide **40**.

Figure 5 shows an air diffusor according to a third embodiment. Here, like in the first embodiment, a second coupling element **18** is provided on which the vanes **14** are rotatably supported with their second swiveling axle **22**. In order to guide the coupling element, a second sliding guide **40** is provided that is positioned perpendicular to the sliding guide **20** for the first coupling element. Since the parallel arrangement of the two coupling elements is ensured by the

connection to the vanes, it is sufficient to have one single sliding guide on the second coupling element.

As an alternative, it would also be possible to use an adjustment wheel with a guide for the first coupling element in order to guide the first coupling element, as is fundamentally known from the first embodiment. Then it is possible to dispense with the adjustment knob for purposes of adjusting the vanes.